# WHICH SUBSTRATE RECIPE FOR YOUR CYCLAMEN?

The substrate is the key element of interaction between **climate management** on the one hand and **irrigation and fertilization management** on the other.

During the long growing cycle of cyclamen, when the risk of root loss is always present, the goal is to keep the roots healthy and active. The quality of the substrate can help the producer to minimize this risk.

For many horticulturists, the control of irrigation makes it possible to control growth well: a good quality substrate will allow easier management of irrigation and thus optimize the quality of the crop. There is a big debate among horticulturists whether the substrate should be suitable for irrigation or irrigation should be suitable to the substrate. A balance between the two seems the most judicious!

The offer and the know-how of the professionals of substrates allow to **customize the recipes** for the cultivation of cyclamen with excellent results.

## *1 - The materials used in the composition of the substrates*

Traditionally, potting soils for flowering pot crops consist mainly of **peat of varying sizes and degrees of decomposition (blond to black peat).**
Peat is known for its good water retention and structural quality. Other materials exist that can be part of our substrate recipes such as: wood fibers, coconut fibers, pine bark, clays...


Different calibers and textures of materials


Different stages of peat decomposition (Blond and black)

## A - List and characteristics of materials additional to peat

| Properties / Materials | Ventilation | Water retention | Cation exchange capacity | Drainage | Rewetting | Buffer effect on pH and EC |
|---|---|---|---|---|---|---|
| Granulated clay | | Good | Good | | Good | Good |
| Clay in powder | | Very good | Very good | | Very good | Very good |
| Perlite | Very good | | | Very good | | |
| Coco fiber | Very good | | | Very good | Good | |
| Wood fiber | Very good | | | Very good | Good | |
| Pine bark | Good | | | Very good | | |

Characteristics of the different materials that can enter into the composition of the substrate in addition to peat.

## B - Wood fibers and clays: the most widely used additional components

For reasons of environmental protection (to avoid the depletion of peat bogs), many suppliers of substrates must incorporate by regulation a **minimum percentage of alternative elements to peat**. Among these, two are widely used and often associated: wood fiber and clay.

**Wood fiber:** it is an element that can replace part of the peat. It provides both good aeration and good drainage of the substrate.
Be careful, depending on its origin and handling, wood fiber can consume a lot of nitrogen when it decomposes. It represents a competitor for the plant in terms of nitrogen consumption. This can also cause pH alterations during cultivation.

To avoid these phenomena:
Upon delivery, carefully monitor the substrate specification to check the nitrogen levels and thus be able to correct them during culture.
How? By carrying out pH conductivity and nitrogen analyzes

**Clays:** Another of the most common additional elements are clays which are traditionally presented in the form of granules and more recently in the form of powder with innovative and interesting compositions.

Clay added to the substrate has many advantages:
- **Better water retention and rewetting during irrigation**
  No loss of drainage capacity, aeration and no risk of sedimentation whatever the growth phase.
- **Guaranteed low carbonate and salt content**
  No changes in pH and no risk in changes of EC at the start of the culture
- **Excellent pH buffering effect**
  Prevents pH drop throughout the crop
- **Prevents leaching of fertilizers**

**= Gain in flexibility in fertilizer dosing**

Substrate testing with clay
and without clay made at Morel in 2020 :

There is a higher root density using clay

Substrate with clay

Clay-free substrate


For further information, consult the detailed sheet on www.cyclamen.com / professional space

### C - A new world without peat!

With the exception of Europe and North America where there are peatlands, other parts of the world have to import peat at high costs. To avoid this, they can use other raw materials that have lower water retention than peat. These raw materials are: bark, forest compost, dried fruit shells or even clays treated at high temperature (Akadama in Japan) in order to obtain greater consistency and increase the degree of porosity.

Three examples of alternative substrate to peat:

Thin bark with sand

Leaf compost

Treated clay (Akadama)

## 2 - What factors should be taken into account when choosing a substrate recipe?

### A - Climate and climatic adjustment of the greenhouse

| ***MEDITERRANEAN AREAS (Southern Europe, California)*** | ***ATLANTIC OR CONTINENTALS AREAS*** |
|---|---|
| • Higher average temperatures:<br>higher plant transpiration rate during cultivation and during flowering.<br><br>• More important irrigation frequencies at the end of cultivation. Between irrigations, the risk of dehydration is higher.<br><br>***RECOMMANDATIONS :***<br><br>= guarantee higher water retention using a smaller blond peat fraction or a brown or black peat, while remaining in low proportions, with the addition of clay. | • Lower average temperature:<br>low plant transpiration<br><br>***RECOMMANDATIONS :***<br><br>= Use peat with larger fractions together with fibers and without black peat, which allows higher irrigation frequencies* without asphyxiating the roots and without the need to dab physically the substrate.<br><br>*Important for the growth activity of the plant: supply of fertilizer and oxygen in addition to water. |

For the more daring ones who are going to manage the climate of their greenhouses with higher lights and temperatures, it is necessary to make a very precise monitoring of the irrigation and to use a substrate with greater water retention.
It is nevertheless necessary to be vigilant according to the growing phase of the culture. Especially at the beginning of growth, to avoid the "suffocation" of the young plant by keeping the pot too wet.

***Check the Technews and the "rooting" webinar.***
English version (C°/ cm)
https://www.cyclamen.com/pdf/technews/201804/potting-en.pdf
American version (F°/in.)
https://www.cyclamen.com/pdf/technews/201606/rooting-us.pdf
https://www.youtube.com/watch?v=VBTKc9rO5Aw

## B - Irrigation management: different systems

| ***DRIP SYSTEM*** | ***SUB-IRRIGATION*** | ***WATERING BY HAND*** |
|---|---|---|
| Currently this system is very accurate. It allows **lower flow rates with more frequent irrigations.**<br><br>In hot countries, it is nevertheless preferable to use substrates with elements capable of re-wetting such as powdered clays or brown or black peat to protect the roots. | With subirrigation, substrate mixtures must have **sufficient capillarity** to ensure wetting of at least ¾ of the volume of the substrate.<br><br>In this case, **the use of coco fiber** peat achieves this objective. | At low frequency and low technology, they present another challenge to create an appropriate recipe for good results. The high flow of each irrigation requires **good drainage** with nevertheless the risk of repeated drying out between each watering. For this, it is necessary to **favor a substrate that is not too coarse** and improved with elements such as clay or black peat that promote water retention to obtain a good quality of cyclamen. |

## C - Pot type and size

**The size of the pot** must be in balance with the **chosen fraction of peat**:

| ***SMALL POT (Ø 6 to 12 cm - 2.5-5")*** | ***BIG POT ( Ø 14 cm - 6" and more)*** |
|---|---|
| For the crops of minis, if the fractions are too large, they can repeatedly suffer from water stress which would lead to a loss of size and quality. | In large pots, the longer crops will need **a heavier**, **more stable substrate structure** that won't change over time (thus structure and porosity remain the same throughout the growth) in order to avoid problems of asphyxia and to allow a higher frequency of irrigation. |

## TERRACOTTA POT

Cultivation in clay pots is quite common and appreciated for the added value of the product in France and Italy.

In this type of culture, **the water consumption can double** compared to a plastic pot due to the transpiration of the pots. The frequency of irrigation can even be twice a day for large plants and if there is little shade. In this case, the **substrate recipes** must have **good drainage** and **good retention** at the same time, a challenge for a substrate supplier!

An additional difficulty is to know the type of pot, which is very variable depending on the type of clay, the way the clay is baked, or the presence of antiperspirant treatment.

Two examples of crops in terracotta pots with extreme water stress in the picture on the right.

Good root system

Root system having suffered repeated water stress

## D - Basic charge fertilizer

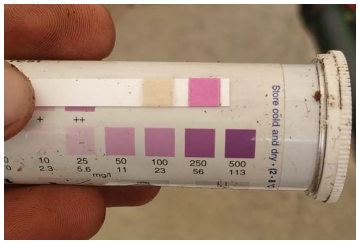
Most substrate suppliers offer basic charge fertilizers to start growing. The question must be asked whether this basic fertilizer load is sufficient or insufficient depending on the climatic parameters of the crop.

**Our recommendations according to the climate:**

| *Hot and Mediterranean climates* | *Atlantic or continental climates* |
|---|---|
| **Lower fertilizer charge** (0.5 to 0.75 kg/m$^3$) in order to have a more precise control on the growth | **Higher fertilizer charge** (1 to 1.5 Kg/m$^3$) to ensure better crop growth with less frequent irrigation. |

It is advisable to check the conductivity, pH and, if the tools are available, also the nitrate levels of the substrates on receipt.

Extra information on the rooting phase can be found in Technews and the "Rooting" webinar:
English version (C°/cm)
https://www.cyclamen.com/pdf/technews/201606/rooting-en.pdf
American version (F°/in.)
https://www.cyclamen.com/pdf/technews/201606/rooting-us.pdf
https://www.youtube.com/watch?v=VBTKc9rO5Aw



Test strips to detect N-$NO_3$ values
(Picture above: about 50 mg / l of nitrogen)

## 3 - Root observation: a tool to assess whether the irrigation management and the substrate used are appropriate

By observing the roots, we can obtain part of the information to assess the state of our crop, although it is not a total guarantee of the final quality.

In retail, plants with healthy roots and with a substrate with good retention, have better shelf life than plants with damaged roots.

You can assess:

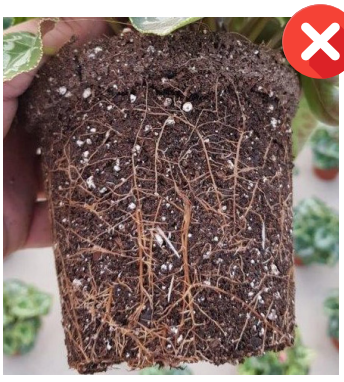
- The quantity of large roots compared to small ones, as well as their density or their branching:
  Lots of big roots = prolonged water stress. It is better to have mostly small roots.
- The volume of roots in relation to the age and size of the plant:
  The older/larger the plant, the more developed the root system needs to be
- The color of the roots:
  White = in good health (allows you to assess the level of recent or past water stress)
- The distribution of roots according to the irrigation system

### Healthy roots

Many small healthy white roots

### Damaged roots

Large roots due to repeated water stress



Brown roots burned by sudden water stress

### Root distribution depending on the irrigation system

Sub-irrigation system (roots located at the bottom of the pot)

Drip system (roots located at dripper location)